(1) Since the surface mounted parts to be solder mounted and the solder connection portions thereof are covered with a low elasticity resin having a modulus elasticity of 200 MPa or less at a temperatures of 150°C or higher when the semiconductor device is mounted by reflow in secondary mounting, even if the internal solder connection portion is re-melted, the pressure caused by the melting expansion can be moderated by the low elasticity resin. As a result, flow out of the solder to the boundary between the surface mounted parts and the resin to prevent the occurrence of short-circuit between the terminals in the surface mounted parts.

(2) Since the flow out of the solder to the boundary can be prevented, it can cope with the secondary mounting by reflow and when the low elasticity resin has a modulus of elasticity of 1 MPa or more at a temperature of 25°C, a sufficient mechanical protection force can be ensured. Accordingly, since it is no more necessary to cover with a casing or a cap, the cost can be reduced.

(3) Since the resin printing coating or the mechanical division after printing can be conducted in a state of a substrate to prepare multiple segments by the use of the silicone resin as the low elasticity resin, sealing or segmentation can be conducted by a method at a reduced cost and, accordingly, the cost can be reduced in the manufacture of the semiconductor device.

(4) Since the flow out of the solder by re-melting to the boundary can be prevented, there is no more necessary to consider the lowering of the melting point of the internal solder caused by the combination of the electrode specification of the surface mounted parts and the solder to be applied, either the solder plating or Sn plating may be adopted to the electrode specification for the surface mounted parts. This enables flexible coping in accordance with the progressing situation for the Pb free trend in parts manufacturers.

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WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

surface mounted parts mounted by soldering;

a wiring substrate on which the surface mounted parts are mounted;

solder connection portions for connecting the surface mounted parts to the wiring substrate; and

a sealing portion formed with an elastic insulative resin for covering the surface mounted parts and the solder connection portions,

wherein the elastic resin is a resin having a modulus of elasticity of 200 MPa or less at a temperature of 150°C or higher.

2. A semiconductor device according to claim 1, wherein the elastic resin is a resin having a modulus of elasticity of 1 MPa or more at a temperature of 150°C or higher.

3. A semiconductor device according to claim 1, wherein the elastic resin is a resin having a modulus of elasticity of 1 MPa or more at a temperature of 25°C.

4. A semiconductor device according to claim 1, wherein the elastic resin is a resin having a modulus of elasticity of 200 MPa or more at a temperature of 25°C.

5. A semiconductor device comprising:

surface mounted parts mounted by soldering;

a wiring substrate on which the surface mounted parts

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are mounted;

solder connection portions for connecting the surface mounted parts to the wiring substrate; and

a sealing portion formed with a silicone resin which is an elastic insulative resin for covering the surface mounted parts and the solder connection portions.

6. A semiconductor device according to claim 1, wherein the elastic resin is a silicone resin.

7. A semiconductor device according to claim 1, wherein the elastic resin is an epoxy resin.

8. A semiconductor device comprising:

semiconductor chips which are surface mounted parts each formed with a surface electrode at its main surface;

chip parts which are surface mounted parts each formed with connection terminals on both ends;

a module substrate which is a wiring substrate on which the semiconductor chips and the chip parts are mounted;

solder connection portions for connecting the chip parts to the wiring substrate; and

a sealing portion formed with a silicone resin which is an elastic insulative resin for covering the semiconductor chips, the chip parts and the solder connection portions.

9. A semiconductor device comprising:

semiconductor chips which are surface mounted parts formed with a surface electrode at the main surface;

chip parts which are surface mounted parts each formed with connection terminals on both ends;

a module substrate which is a wiring substrate on which the semiconductor chips and the chip parts are mounted;

solder connection portions for connecting the chip parts to the wiring substrate; and

a sealing portion formed with an insulative resin having a modulus of elasticity of 1 MPa or more and 200 MPa or less at a temperature of 150°C or more and a modulus of elasticity of 200 MPa or more at a temperature of 25°C for covering the semiconductor chips, the chip parts and the solder connection portions.

10. A semiconductor device according to claim 9, wherein the insulative resin is an epoxy resin.

11. A semiconductor device according to claim 10, wherein chip parts are mounted by soldering to the substrate terminals each formed with a gold plating layer, Sn plating layer or Pb-Sn series solder plating layer at the surface.

12. A semiconductor device according to claim 11, wherein the surface electrodes of the semiconductor chips are wire bonded by gold wires to the substrate terminals each formed with a gold plating layer, with a Sn plating layer or a Pb-Sn series solder plating layer at the surface.

13. A semiconductor device according to claim 11, wherein the main surface of the semiconductor chips and the surface

of the wiring substrate on the side of supporting the chips are opposed to each other and the surface electrodes of the semiconductor chip and the substrate terminals each formed with a gold metal layer, an Sn plating layer or a Pb-Sn series solder plating layer at the surface are connected by way of gold bumps or solder bumps.

14. A semiconductor device according to claim 12, wherein the semiconductor chips and the chip parts are mounted on a rectangular module substrate, and the wire loops of the gold wires are formed in the direction parallel with the longitudinal direction of the module substrate.

15. A method of manufacturing a semiconductor device comprising the steps of:

mounting surface mounted parts by soldering connection to a wiring substrate; and

covering and resin encapsulating solder connection portions formed by the solder connection and the surface mounted parts with an elastic insulative resin having a modulus of elasticity of 200 MPa or less at a temperature of 150°C or higher.

16. A method of manufacturing a semiconductor device according to claim 15, wherein resin capsulation is conducted with an elastic insulative resin having a modulus of elasticity of 1 MPa or more at a temperature of 150°C or higher upon resin encapsulation.

17. A method of manufacturing a semiconductor device according to claim 15, wherein a resin having a modulus of elasticity of 1 MPa or more at a temperature of 25°C is used for the elastic resin.

18. A method of manufacturing a semiconductor device according to claim 15, wherein a resin having a modulus of elasticity of 200 MPa or more at a temperature of 25°C is used for the elastic resin.

19. A method of manufacturing a semiconductor device according to claim 15, wherein a silicone resin is used as the elastic resin.

20. A method of manufacturing a semiconductor device according to claim 15, wherein an epoxy resin is used as the elastic resin.

21. A method of manufacturing a semiconductor device according to claim 15, wherein the chip parts as the surface mounted parts are mounted by soldering to the substrate terminals each formed with a gold plating layer, an Sn plating layer or Pb-Sn series solder plating layer at the surface of the wiring substrate.

22. A method of manufacturing a semiconductor device according to claim 21, wherein the surface electrodes of the semiconductor chips as the surface mounted parts and the substrate terminals each formed with a gold plating layer, an Sn plating layer or a Pb-Sn series solder plating layer at

the surface are wire bonded by gold wires.

23. A method of manufacturing a semiconductor device according to claim 21, wherein the surface of the semiconductor chips and the surface of the wiring substrate on the chip carrying side are opposed and the surface electrodes of the semiconductor chips as the surface mounted parts and the substrate terminals each formed with a gold plating layer, an Sn plating layer or a Pb-Sn series solder plating layer at the surface are connected to each other by gold bumps or solder bumps.

24. A method of manufacturing a semiconductor device according to claim 22, wherein the semiconductor chips and the chip parts are mounted on a rectangular module substrate as the wiring substrate and, subsequently, wire loops of the gold wires are formed in the direction parallel with the longitudinal direction of the module substrate when the surface electrodes of the semiconductor chips and the substrate terminals are wire bonded by the gold wires.

25. A method of manufacturing a semiconductor device comprising the steps of:

providing a substrate to prepare multiple segments in which plural device regions are partitioned and formed by partition lines;

mounting surface mounted parts to the device regions by solder connection;

collectively covering and resin encapsulating the solder connection portions of plural device regions formed by solder connection and the surface mounted parts with an elastic insulative resin and forming a collective sealing portion on the substrate to prepare multiple segments;

forming cut-in portions on the surface of a collective sealing portion along divisional lines corresponding to and on the opposite side of the partition lines of the substrate to prepare plural segments; and

dividing the substrate to prepare multiple segments along the division lines and dividing the collective sealing portion by cut-in portions into individual segments.

26. A method of manufacturing a semiconductor device comprising the steps of:

providing a substrate to prepare multiple segments in which plural device regions are partitioned and formed by partition lines;

mounting surface mounted parts to the device regions by solder connection;

collectively covering and resin encapsulating the solder connection portions of plural device regions formed by solder connection and the surface mounted parts with an elastic insulative resin and forming a collective sealing portion on the substrate to prepare multiple segments;

applying identification marks by laser on every device

regions on the surface of the collective sealing portion; and

dividing the substrate to prepare plural segments into segments along division lines corresponding to and on the opposite side of the partition lines.

27. A method of manufacturing a semiconductor device according to claim 25, including the steps of: forming grooves corresponding to the division lines of the substrate to prepare multiple segments on the surface of the collective sealing portion by laser when using a silicone resin as the elastic resin; and appending identification marks on every device regions on the surface of the collective sealing portion by using an identical laser.

28. A method of manufacturing a semiconductor device comprising:

providing a substrate to prepare multiple segments in which plural device regions are partitioned and formed by partition lines;

mounting surface mounted parts to the device regions by solder connection;

applying printing by using a squeezer so as to collectively cover solder connection portions of plural device regions formed by solder connection and the surface mounted parts with an elastic insulative resin, thereby forming a collective sealing portion on the substrate to prepare multiple segments; and

dividing the substrate to prepare plural segments into individual segments along division lines corresponding to and on the opposite side of the partition lines.

29. A method of manufacturing a semiconductor device comprising the steps of:

providing a substrate to prepare multiple segments in which plural rectangular device regions are partitioned by partition lines;

mounting chip parts and semiconductor chips as the surface mounted parts by solder connection to the device region;

wire bonding the surface electrodes of the semiconductor chips and the substrate terminals of the device regions of the substrate to prepare multiple segments by forming wire loops of gold wires in the direction parallel with the longitudinal direction of the device regions;

collectively covering and resin encapsulating the solder connection portions of the plural device regions formed by the soldering connection and the surface mounted parts with an elastic insulative resin thereby forming a collective sealing portion on the substrate to prepare plural segments; and

primarily dividing the substrate to prepare multiple segments with division lines along the longitudinal direction of the device region and corresponding to and opposite side

on the partition lines and thereafter secondarily dividing one row segment group formed by the primary division along the division lines in parallel with the lateral direction thereof into individual segments.

30. A method of manufacturing a semiconductor device according to claim 25, wherein a silicone resin having an modulus of elasticity of 1 MPa or more at a temperature of 150°C or higher is used as an elastic resin.

31. A method of manufacturing a semiconductor device according to claim 28, wherein an epoxy resin having a modulus of elasticity of 1 MPa or more and 200 MPa or less at a temperature of 150°C or higher and a modulus of elasticity of 200 MPa or more at a temperature of 25°C is used as the elastic resin.

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